LUBRICATION

Published by THE TEXAS COMPANY

17 Battery Place, New York City

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Edited by

L. H. CANFIELD, Ph. D.

VOL. IV FEBRUARY, 1917 No. 4

Published Monthly in the interest of efficient lubrication.

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EDITORIALS

Has it ever occurred to you that The Texas Company might be of assistance to you in increasing the efficiency with which your plant is being lubricated? In spite of the fact that more and more attention is being devoted to the subject of lubricants and lubrication, in nine plants out of ten the waste of lubricants and power and the unnecessary wear and tear on machinery because of poor lubrication is appalling.

The natural tendency is to take it for granted that the oils which are being used are suitable and that the plant is being efficiently lubricated, until a bearing burns out or a cylinder is found badly scored, or something else calls particular attention to the fact that the lubrication has not been satisfactory. As a matter of fact, few plants are equipped to handle lubricants in the most efficient manner, and a still smaller number has taken any trouble to select the one lubricant most suitable for the conditions involved.

The Texas Company maintains in every district in this country and also in foreign countries a chief lubrication engineer, together with a staff of competent lubrication engineers, whose function is to go over plants, investigate all conditions, and make recommendations as to the most suitable lubricants to be used and the best methods of handling and applying them. If our engineers can be of service to you, or if you would be interested in seeing any of the line of Texaco lubricants tried out in your plant by our engineers, we shall be pleased to hear from you.

In the August, 1916, issue of "Lubrication" we called attention to a rule for rating oils, which was given in the June 13th, 1916, issue of *Power*, page 848. We are pleased to note that we are not the only ones who have called attention to the fallacies which show on the face of this arbitrary method of rating a lubricating oil. The following is quoted from a letter from H. R. Smith, Annapolis, Md., which ap-

peared in the September 19th, 1916, issue of *Power*, page 426:

"The suitability of a lubricating oil is determined entirely by the conditions governing its use. An oil must be chosen according to its physical and chemical properties, to fit the peculiarities and difficulties met with in each particular case. It therefore seems illogical to adopt an arbitrary mathematical rule, without a mathematical basis of reasoning, to fit a so widely varying series of conditions as found in efficient lubrication.

"An analysis of the rule given by Mr. G. A. Smith will show how much it falls short of being a reliable indicator. In this rule the flash point is the controlling factor, while in practice it is one of the least influential of the physical properties except in steam cylinder lubrication. The viscosity, which is of the greatest importance, has a very slight influence on the percentage quality as determined by the rule given. A change in viscosity of 100 seconds Saybolt (about 2.8 Engler degrees) at 100 degrees F. will cause quite a difference in the frictional loss, but in the quality determination shows practically none. The cold point has little influence on the lubricating properties of an oil used on bearings operating at ordinary temperatures. The suitability is not dependent on specific gravity, but is only a means of identifying the crude from which the oil is derived. Free acid is almost always absent in straight-run pure mineral lubricating oils, while the carbon content as generally determined is so small in these oils as to be negligible.

"An examination of the table of results on four very acceptable oils given herewith, will show the incompatibility of the rule under discussion. It will be noticed that the percentage quality is almost wholly dependent on the flash point, which is an entirely wrong basis for judgment:

	Oil No. 1	Oil No. 2	Oil No. 3	Oil No. 4
Viscosity, 120 deg.x 1..	4.9	5.0	3.1	3.5
Viscosity, 180 deg.x10..	20.5	20.0	18.0	18.0
Flash point.....	338.0	455.0	334.0	428.0
(1) Sum.....	363.4	480.0	355.1	449.5
Cold point.....	0	plus 20	minus 5	plus 25
Free acid.....	0	0	0	0
Carbon residue.....	0	0	0	0
(2) Sum.....	0	plus 20	minus 5	plus 25
Difference in (1) and (2).	363.4	460.0	360.1	424.5
Difference÷5.....	72.7	92.0	72.0	84.9
Specific gravity.....	0.937	0.885	0.910	0.878
Per cent. quality.....	68.1	81.4	65.5	74.5

"From the table we see that oil No. 2 rates higher than No. 1 and is therefore classed, according to this method, as a better oil. If we add 0.5 per cent. of free acid to No. 2, the percentage quality will be $\frac{480-(20+50)}{5}\times 0.885 = 72.6$, which is still above that of No. 1, and yet, because it contains free acid, it is not at all acceptable.

"The mention made by Mr. Smith of a variation in the formula for different classes of oils permits of a change in only the constants used. All four oils, in the table, intended for forced-feed lubrication purposes, have been fully analyzed and tested under operating conditions and found satisfactory. Considering this one class of oils a variation of 13 per cent. quality is found, for different oils submitted for the same purpose, having the same viscosity but from different crudes. Oil has been examined and found to have practically the same physical constants as those used in finding the quality of No. 3 in the table, but it was not suitable for the same purpose.

"All this shows the inconsistency and impracticability of attempting to combine the chemical and physical characteristics of a lubricating oil to form an empirical mathematical rule for the determination of quality."

BURNOIL ENGINES

By N. KJELGAARD
Engineer, Burnoil Engine Co.

ENCOURAGED by the courtesy of "Lubrication," the writer is very pleased to have the opportunity of giving a brief description of the general principles underlying the construction and operation of the Burnoil Engine.

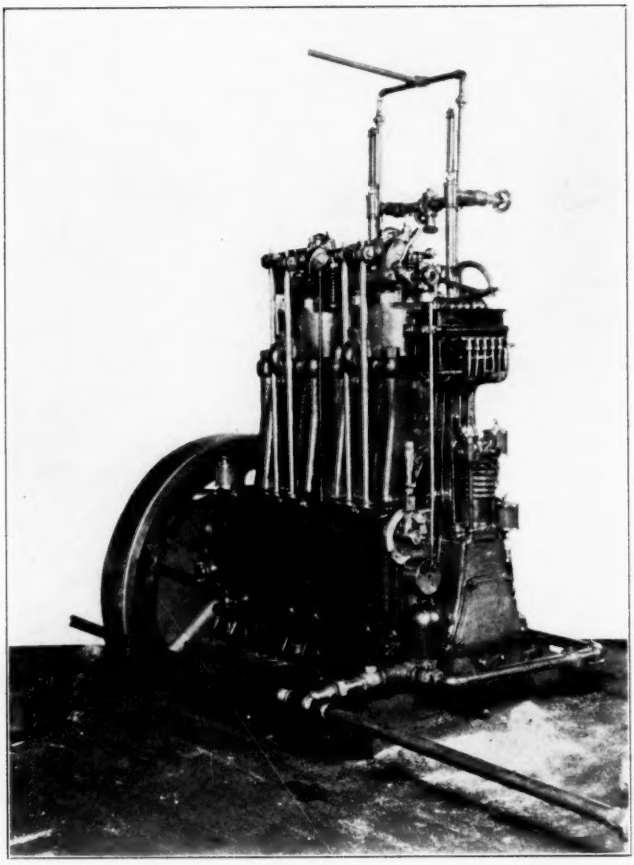
The basic invention was made in Holland and the engine is in Europe known as the Brons Engine, after the inventor. Besides being built in Holland and in most of the industrial countries in Europe, it has been built in this country for three or four years under the original and additional American patents, controlled by the R. M. Hvid Co., of Chicago.

The engine is a universal engine, in the understanding that it can be operated anywhere and by any one in any service. For instance, engines made in Holland are shipped to Dutch India, transported through rough country out in the wilderness, turned over to natives and operated successfully by them on their cheap oils. The opposite conditions are illustrated in an electric power plant with which the writer was connected. Here two single cylinder engines each developing 60 h.p. were directly connected to alternating current generators, and ran to the entire satisfaction of everybody concerned. In another instance, the writer saw daily a 50-h.p. single cylinder engine carry the load of a part of a machine shop for five months, running continually twenty-four hours a day and only shut down Sundays. This engine was not touched for repairs or adjustments of any kind during this period, in spite of the fact that it was virtually overloaded.

In the marine field, the achievement of this engine is best illustrated by the results of a fishing boat contest conducted under the auspices of the German government. This contest began in 1908 and final award was made in 1911. An unusual clause in the rules was, that each competing motor should be left in the hands of the fishermen for one year, during which period it should be used for 1,000 hours and given attention only by the crew. Burnoil type engines were entered in two classes and each engine went through the year's trial, not only winning first prize, but showing qualities far superior to any of the competitors.

In the Burnoil four-cycle engine is embodied not alone the most scientific and economical principle of combustion, but also all the advantages of the Diesel engines and, as it eliminates the exceedingly delicate high pressure air compressors and fuel oil pumps, it does away in short with the disadvantages in the Diesel engine. It employs no water injection, no hot ball, hot plate or hot pipes, and consequently there is no trouble with cracked balls or any other trouble characteristic of semi-Diesel engines. There are no red-hot parts in the Burnoil engine and it has no spark plug, no electric ignition and no carburetor.

The patented features of this engine have made an engine with few parts possible, thereby insuring less wear and long life of the engine; this has furthermore been accentuated by a rigid design with the intention of diminishing all vibrations. By connecting the cylinders to the bed plate by means of long through bolts



Burnoil Engine

extending from the bottom of the engine to the head, it has been possible to build a comparatively light engine of great strength. The engine is of the modern entirely enclosed type, which means that not alone all moving parts are entirely enclosed, but all auxiliaries are built integral with the engine. In this design has been arranged means for the oil distribution so that not alone the main parts in the engine but all minor details as well can be copiously supplied with oil.

It has been the endeavor to work out an oiling system which, so to speak, automatically takes care of every moving part and which in spite of its thoroughness is easily handled by the operator of the engine. All this man has to do while running, for instance, the two-cylinder 20-h.p. Burnoil Engine illustrated herein, is to keep one force feed oiler and three drip oilers provided with lubricating oil. Realizing that even the most thorough distribution of oil is only one side of a highly effective lubrication system, the importance of employing the proper oil in the proper amount is always emphasized by the Burnoi

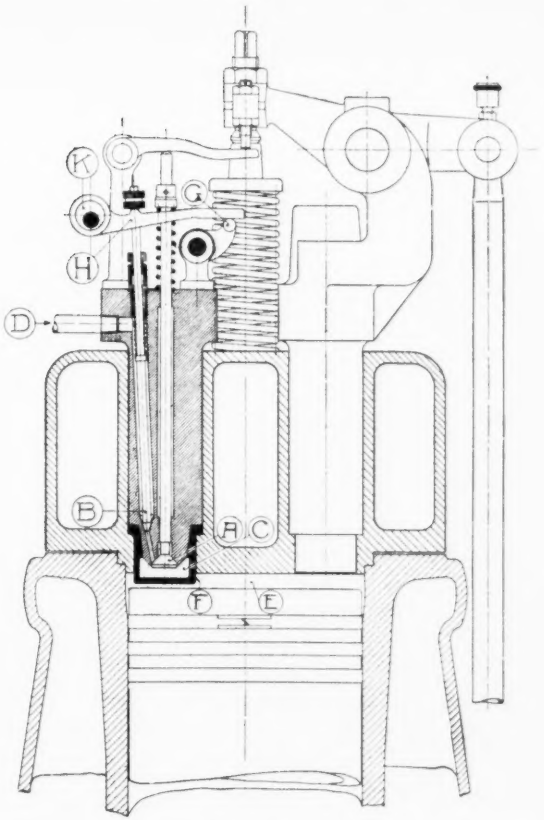


Figure 1—Sectional View of Atomizer

Engine Company, and it is conceded that the best lubricants generally are the cheapest as they can be relied upon to be used with the best results in small quantities.

As in the case of the four-cycle Diesel Engine, only pure air is admitted to the cylinders of the Burnoil engines under the intake stroke and compressed under the returning stroke to a pressure of about 450 pounds per square inch, whereby it becomes heated to about 1,000 degrees F. A moment before the piston has finished this stroke, the oil is introduced into this heated air in a very fine spray and in such a way that complete combustion takes place and drives the piston on its power stroke.

The essential patented features of the Burnoil Engine relate to the method of introducing the oil and are very simple as will be seen from the illustration. Fuel from a supply tank is fed by gravity through a pipe to inlet (D) past valve (B) to seat of fuel valve (A), which is opened under the intake stroke admitting the required amount of fuel to the bottom of the fuel cups (C) extending down into the cylinder.

During the compression stroke the heat created by the compression of the pure air in the cylinder will be transmitted through the walls of the

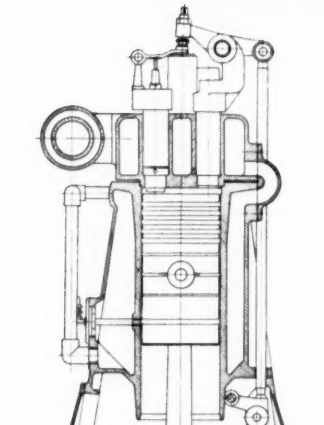


Figure 2—Sectional View

cup, vaporizing part of the fuel inside the cup; at the same time a little hot air enters the fuel cup through small holes (F), so that the vapor at the end of the compression stroke will ignite and cause a little explosion, the force of which will spray the still fluid main part of the fuel through the small holes (F) into the cylinder where the main combustion then gradually takes place.

The amount of fuel allowed to the cup is controlled by a governor operating the lever (G) up and down, thereby measuring the quantity being required for the immediate load.

The Burnoil Engine is at present built by the Burnoil Engine Company, South Bend, Indiana, in a horizontal type for small farm engines and a larger multiple cylinder vertical type for stationary work and marine work as well.

TEST OF TEXACO URSA OIL ON VERTICAL BURNOIL ENGINE

Burnoil Engine Co., South Bend, Indiana, September, 1916.

AT the time of making the test herein recorded, it was planned to have the same comparative in nature, and arrangements were made to make two runs, the figures from which could be compared. The arrangements were such that the Texaco Ursa Oil would be in service during one operating run, whereas on the second run, that oil which had been found to give the best service in previous trials would be used. It later developed that a sufficient quantity of this latter oil could not be secured within the desired time, and accordingly it was not possible to follow out the original plan. Nevertheless, the run on Texaco Ursa Oil was made as complete as possible. The entire test came under the attention of Messrs. C. A. Ross, President, and N. Kjelgaard, Designing Engineer of the Burnoil Engine Company.

The engine under test was a two-cylinder 20 h. p. vertical type engine, 6¾ inch bore by 9-inch stroke, running 425 r.p.m. It operates under the Diesel cycle, using an explosion cup for the atomization of the fuel, in place of the usual high pressure method of atomization. The cylinders are water-cooled, provision for cooling water during the test having been made by having a reservoir arranged so that part of the water

discharged from the jackets was reused in connection with cold make-up water, thus permitting of a control of temperature.

The lubricating system consisted of a six-feed one-compartment force feed oiler, there being one feed each to the cylinders, one each to the main bearings, and one to the cam-shaft. The oil fed to the cylinders is relied upon for the lubrication of the wrist-pins, and the oil supplied to two of the main bearings works down through a hollow crank and lubricates the crank pins. The cam-shaft is hollow and openings are provided so that the oil fed thereto will reach the cam-shaft bearings and also work out to lubricate the cams. Besides the main oiler, there are three drip cups, one of which is on the air pump, another on a jack shaft bearing, and the third feeding oil to the cam-shaft gearing. All of this oil is drained into an enclosed crank case.

During the test, a pony brake arrangement was set up so that a load might be applied to the machine. At the time of starting the run, the engine had operated approximately two full days since it had last been dismantled and thoroughly cleaned. Immediately following the reassembling at this time, the competitive oil had been used during a five-hour run, which apparently showed more favorable results than had been secured previously. The supply of oil being exhausted at this time, Texaco Ursa Oil was put into service and continued during the one and one-half days of intermittent operation up to the time of the test. Immediately preceding the actual run the engine operated three hours on no load and fifteen minutes with full load. During the entire run, the load was maintained constant. As previously stated, Texaco Ursa Oil was used on all parts, cylinders as well as bearings, and data was secured to bring out fuel consumption, lubricating oil consumption, temperature of bearings and the heating at the cylinder as would be indicated by the cooling water. The run was of four hours duration, readings being taken every half hour, with the exception of the quantity measurements of the oils and the bearing temperatures. The thermometers located at these bearings were set in tap openings in the bearing caps, being as near to the journal surfaces as it was possible to get. They were, however, not accessible for regular readings and accordingly only one reading was taken at the close of the run.

SUMMARY

AVERAGES AND EXTENSIONS

Duration of run	4 hours.
Speed	430 r.p.m.
Brake load	20 h.p.

FRICTIONAL TEMPERATURE, MAIN BEARINGS

Pump end	38.5° F.
Center	33.5° F.
Wheel end	35.5° F.

FUEL

Amount used per hour	11 lbs. or 1.5 gal.
Amount used per B.H.P. per hour	.55 lbs. or .075 gal.

LUBRICATING OIL (TOTALS)

Amount used in cylinders per hour	85 c.c. or .0224 gal.
Amount used on all bearings per hour	460 c.c. or .121 gal.
Amount used on entire engine per hour	545 c.c. or .143 gal.

Supplementing the summary table, remarks should be included on the condition of the cylinders after this period of operation. First, it should be recalled that the period of operation since the last inspection and cleaning, was more than two days, during the first part of which a different oil had been used. When the heads were removed from the cylinders, it was found that the deposit thereon, as well as on the top of the piston, was soft and sooty in nature, with the exception of a small portion immediately behind the fuel cup where the sweeping effect of the flames was not to be felt. After the removal of the pistons, it was found that with the ex-

ception of the top one on No. 1 cylinder, all of the rings were free. The cylinder walls themselves showed an extremely good film of oil at all points. In this connection, it might be stated that with the exception of one brief moment, there was no leakage of gases beyond the rings; the exception involving one cylinder only, and it is accounted for by a dropping off of the rate of feed. These good conditions, it will be seen, were brought about through the use of less than one-tenth of a pint of lubricating oil per cylinder per hour.

While it is not the purpose of this report to make comparisons with other runs not handled in a like manner, still it is not believed that it would be out of place to mention that in previous trials the quantities of lubricant used amounted to considerably more, nor were the results obtained as satisfactory, in the way of the seal produced at the piston rings or in the cleanliness of the internal parts. This information was gathered from Mr. Kjelgaard, whose close relationship with the performances of the engine places him in a position to make good comparisons.

The information gathered regarding the lubrication of the external parts is also to be commented upon as being very favorable. The frictional temperatures shown at the main bearings are to be considered low when the heavy duty constant load and high speed of the engine are realized. The amount of oil fed to these parts was undoubtedly more than really required to provide protection, inasmuch as approximately five times as much oil was used to lubricate the external parts as was found necessary for the cylinders and wrist pins. To bring this out more clearly, comparison of the surfaces lubricated might be made, regarding which the figures show that 427 square inches represents the lubricated surfaces of the two cylinders and wrist pins, whereas the two cranks and three main bearings represent only 242 square inches of surface. It is realized that the service required at each point is not the same, and it is not possible to make recommendation of rates of feed upon a knowledge of the amount of surface only. On the other hand, it is believed that this amount could be materially reduced, considering that the work at the pistons and wrist pins was handled by such a small amount. At installations where a filter is provided for the reclaiming of the oil from the crank case for re-use, this point does not involve as strong an argument, whereas, if the oil being fed is discharged to waste, the cost of operation might be very materially reduced.

It is believed that the results which this test has shown have brought out the points which were emphasized as desirable features in Texaco Ursa Oil. It was brought out that Ursa Oil embodied a combination of merits, making it suitable for this heavy duty internal combustion work. The high viscosity, together with low flash and fire and the soft nature of the small carbon deposit left, were suggested as the reasons for the results which might be expected. This test has corroborated the statements previously made.

Respectfully submitted,

HOWARD COOPER,
Engineer, Chicago District.

Approved:
O. J. MAY,
Chief Lubrication Engineer,
Chicago District.
The Texas Company.

CRATER COMPOUND

AS a gear and pinion lubricant Texaco Crater Compound recently covered itself with glory in a particularly severe test in a rolling mill in Pennsylvania.

The machinery in this plant was antiquated and in very bad repair. The superintendent was under the impression that the pinions in the 10-inch finishing mill were well lubricated, his opinion being based on the appearance of the back side of the teeth. The Texas Company's representative, however, observed that the running side was bright, cut and scored, and showed no trace of lubrication, that the teeth were worn down to a knife edge, and that there was approximately an inch of hard residue deposited between the teeth by the lubricant then in use. He explained to the superintendent the advantages of Crater Compound in that it would not harden or pack in the teeth, would form a thin film on the running side of the teeth where lubrication is necessary, was impervious to water, and could be used in an enclosed pinion case with safety since it would not catch fire from sparks thrown from the rolls.

Operation of this mill could not be suspended long enough to clean the pinions, so kerosene was employed for this purpose, and after cleaning, the Crater Compound was applied hot. Two applications were made during the day, and in the evening when the mill was shut down the superintendent was greatly surprised at the fine lubricated appearance of the gears. The following day Crater Compound was applied to the gears and pinions of the squeezer and of the muck bar mill, with excellent results in both cases. The superintendent thanked our representative for the service rendered and assured him that in the future he would use Crater Compound exclusively on gears and pinions throughout the plant.

At the Third Annual Meeting of Lubrication Engineers held at New York October 11th to 14th inclusive, Mr. H. W. Salbador read an interesting paper on "Engineers New in the Oil Business," from which we quote as follows:

"After eighteen years practical experience in handling lubricating oils on marine engines I was naturally under the impression that I had a rather extensive knowledge of oils in general, but I want to frankly confess that after a few months as a staff engineer in the Lubricating Division of The Texas Company I have reached the conclusion that the oil business is a much wider field than I had ever realized.

"A brief time was spent in the office going over the reports of engineers from the various fields, after which I was sent out to assist in making a comparative test of Crater Compound and a competitive gear coating on the gears in a large rolling mill in the Chicago District. I found that the master mechanic was at first opposed to the test, as he had used the competitive oil for several years, and objected to trying a new lubricant. I talked the matter over with our operating inspector in that district, and we had another interview with the master mechanic, finally persuading him to give Crater Compound a trial on the ground that it had already been proven the best gear lubricant on the market. He consented to let us make a demonstration upon our promising to have an engineer on the job night and day.

"We were given the large bevel gears on two of their mills. These gears were driven by a large cross compound engine, with four sets on one side of the engine and six sets on the other side, ranging in size from 3 to 11 feet in diameter, the pinion shaft running 80 r. p. m. When they were using the competitive oil it required the services of two men to do the lubricating, which had been accomplished by pouring on the lubricant by the bucketful and using about 160 pounds per day. The surroundings, including the oilers, had been fairly swimming in the oil.

"We began our test on Sunday night and ran it until the following Saturday night, consuming, on the average, about 10 pounds of Crater per day. The oilers and the millwright were delighted with the change of conditions, as their work was easier and they looked a little more like the white men that they were. We had taught them to use Crater Compound by painting the teeth with a brush.

"During the latter part of the week we discovered that our supply of Crater Compound was disappearing rapidly. We knew that we were not using all of it on the gears, and upon investigation found that the engineers and millwrights around the plant were applying Crater to different units in their departments. From their conversation it was easy to see that they felt that they had discovered a bonanza.

"At the end of the seven-day demonstration we asked the master mechanic if he was satisfied with the results obtained from the use of Crater Compound. He replied that he wished us to make another test on the gears in another mill where he considered the strain would be greater, as the gears were in continuous operation, running 23 hours each day. In this mill also there were ten sets of bevel gears, ranging from 3 to 8½ feet in diameter, also driven by a cross compound engine. The same condition had prevailed here as in the other mill. On these gears they had used 210 pounds of the competitive oil per day, whereas with Crater Compound the consumption was about 28 pounds per day. This test was also finished in a week, and everything was left running smoothly. Today the master mechanic is the biggest booster that Crater Compound has, and is now using it throughout his entire plant."

Mr. Meade, the superintendent of the Virginia Box & Lumber Co., Goldsboro, N. C., has been having a good deal of trouble on account of his belts and cables slipping. He had purchased a barrel of Crater Compound on Mr. Chesson's recommendation, but had not used any at all. I applied Crater Compound to his carriage cable, which had been slipping, and it seemed to work wonders, taking every bit of the slip out. This was quite a bad job on account of our inability to take the cable off, but after a while I succeeded in getting it applied very nicely.

I also applied Crater Compound to an old canvas belt that he had discarded as no good, and after trying it to see how it worked, he decided to keep it on and use it instead of the new one that had just been put on to-day.

Crater worked so well for Mr. Meade that he wanted it applied to every place where it could be used. I applied it to his carriage and chains, and it worked nicely in all of these places.

(Signed) C. S. BROADHURST,
Demonstrator,
The Texas Company.

The Goldsboro plant of the Virginia Box & Lumber Co., writes us under date of November 2, 1916, as follows:

"It is with pleasure that I say to you that the barrel of Crater Compound bought of your Mr. Chesson several weeks ago and demonstrated by Mr. Broadhurst, is all that could be expected. It not only stopped the cable of my log carriage from slipping on the drum, but I find it to be a fine belt dressing.

"It is not often that I write a letter of this kind, but Crater Compound fills a long needed want and other people should know it. It is great stuff.

"Yours very truly,
"(Signed) G. T. MEADE,
"Superintendent."

"I called today at the Blank Cotton Mills. When I was here in the spring I induced them to put in a twenty-five pound can of Crater Compound for trial on cables, of which they have several thousand feet in use in their mills.

"Today the engineer said it was the best cable lubricant they ever saw. I attach their order for one barrel. This concern uses $10,000 worth of lubricating oil per year.

"CRATER JONES."

TEXACO LUBRICANTS*

THE Texas Company produces, manufactures and markets lubricants of every variety and for every purpose, from the lightest spindle oil to the heaviest gear compound and the highest grade cylinder and valve oil. There are no conditions in or around the power plant which they cannot take care of with great efficiency and economy. They make this statement advisedly and confidently, for they have proven it time and time again, not alone to their own satisfaction, but to the satisfaction of any number of consumers.

The Texaco cylinder oils are carefully manufactured from high grade crudes and are strictly speaking quality products. Any conditions, from those of high pressure superheated steam to low pressure moist steam, and from the most severe and exacting work to uses where economy of feed, and therefore an expensive oil is out of the question, are within the scope of their list of cylinder oils. Cylinder and valve lubrication is a very important matter; unsuitable oils are ultimately a great waste, and The Texas Company gives full and due consideration to this important branch of the lubricating business.

As for the Texaco engine and machine oils, their only regret is that the consumer does not know them as well as they do. Unfortunately it is impossible to convey to him the confidence and pride with which The Texas Company regards these products. They have met so many lubricating problems and solved them with such wonderful success that they have come to regard their oils manufactured from the low gravity Southwestern crudes with awe and respect. These are the oils,

*_Pure Products_. December, 1916, p. 620. Published by Scientific Station for Pure Products, New York. This is an extract from an article, "Power Plant Lubricating Efficiency," by Dr. L. H. Canfield, in "Lubrication," November, 1914.

for example, which are being used in the battleships, destroyers, submarines and aeroplanes of the United States Navy, which are being installed in some of the largest plants in the United States, and which are everywhere, when properly used, giving absolute satisfaction. These oils are also being used in turbines and continuous systems where the oil has been in continuous use for over a year, and is still as good a lubricant as when first installed.

Oils from this crude cover a wide range of viscosity or body. The lightest oil is being used with the greatest success as a spindle oil in the cotton mills. The heaviest oil is heavier in body than any other straight mineral oil on the market. In between these two extremes are Texaco oils of any desired body, ranging in price from the least expensive red oils to the most expensive extra pale filtered oils.

This wide range of viscosity is important in that it does away entirely with the process of mixing oils, an expensive and wasteful practice. To use a high-priced cylinder oil to increase the body of a machine oil is not only more expensive, but the resulting lubricant is never as good as a straight mineral oil. In a typical case a mixture of steam cylinder oil and engine oil was being used, the engineer stating that it was necessary to use the cylinder oil because of the high temperature of the bearings. When the engineer of The Texas Company suggested using a regular engine oil of the proper viscosity, the engineer threw up both hands, insisting that the bearings would burn out. A test was finally made, with the following results, which are average readings taken after the bearing reached its maximum temperature:

Date	Oil	Bearing Temperature	Room Temperature	Frictional Temperature
Aug. 24	Old Mixture.....	170°	74°	96°
Aug. 26	Texaco Aleph Oil	138	78	60
				36°

Reduction in frictional temperature, 36 degrees F., or 37.5 per cent. After the test the mixture was again used and the temperature again went up to such a point that an order was sent in for immediate delivery of Texaco Aleph Oil.

For bearings too inaccessible for oiling, or where the pressure is very great, The Texas Company has an exceptional line of greases. The lubricating qualities of a grease are derived entirely from the oil used in its manufacture, and therefore the grease can never be any better than the oil used. Too many greases are made from cheap slop oils or even from a large percentage of water. For pump plungers and for gears The Texas Company has two special preparations called Crater Compound and Thuban Compound. They are not affected by water or by heat, will take care of the most severe conditions and will wear indefinitely.